

DECLARATION UNDER RULE 132

The co-inventor Yoshikazu Matsumoto has signed the attached Declaration Under Section 132 traversing the rejections based upon the Aoki reference. This Declaration will be explained and referred to in the remarks below.

REMARKS

Claim 1 as amended, and claims 3-9, as originally filed, remain in the case. Claim 2 has been cancelled because its parameters are now defined within the amended claim 1. Claim 10 has been newly added to incorporate a dependent claim directed towards the polyisocyanate constituents referred to at page 6 lines 3 - 17 of the Specification. No new matter has been added and the newly added dependent claim should raise no materially new issues.

Claim 1 has been amended primarily to further delineate that the material of the invention "consist essentially of" polyisocyanate and polyol, and to incorporate the metes and bounds of the curing times, as set forth in the Specification at page 18, Table I.

Accordingly the present invention, as amended, resides in the unexpected discovery of a moisture-curable urethane prepolymer of the type which previously required dipping in substantial amounts of water, and longer cure periods, but which can now be cured with a water spray in a very short period of time within minutes. Surprisingly, the forming material is a moisture curable polyurethane prepolymer which "consist essentially of" polyisocyanate and polyol, where the need for β -amino- β -propiolactam curing agents is negated. It is critical in formulating the polyurethane prepolymer that it limits the concentration of isocyanate radicals to about 1-5% by weight, in what the prior art characterizes as and what the Applicant declares is a "one component" curing reaction mechanism or method.

This invention has been rejected under 35 U.S.C. 103 as obvious over Hirano et al. (U.S. Patent No. 6,027,777) in view of Aoki et al. (U.S. Patent No. 4,880,869).

The Hirano reference has been cited by the Examiner as disclosing the Applicant's earlier type of forming material calling for dipping in water. The Examiner has properly identified that the earlier Hirano disclosure does not disclose the hardness characteristics of the present invention nor the critical 1-5 weight percent isocyanate concentration.

The Aoki reference has therefore been cited to bolster the deficiency of Hirano because of Aoki's disclosure of moisture-curable urethane prepolymers formulated with 1-5% isocyanate radicals, believing the physical characteristics of the present invention would be inherent. The Examiner has conceded that the Aoki reference does require β -amino- β -propiolactam derivatives but contends that the claims as previously drafted, prior to this Amendment, did not preclude the use of additional components. The Examiner contends that Aoki's "additional materials" do not negate its teaching of the concentration of as low as 0.5% isocyanate radicals.

This rejection is traversed and reconsideration is respectfully requested for the reasons hereinafter set forth.

The references, even in combination, would fail to mention or suggest the present invention for three reasons.

- (1) First, the claims, as amended, are more limited.
- (2) Secondly, the Aoki polyurethane prepolymers which contain the 0.5 to 20% isocyanate concentration, do not "consist essentially of" polyisocyanate and polyol. But rather, those materials contain a special "curing agent" which modifies the reaction mechanism and the characteristics of the cure. That is, Aoki explains at column 1 lines 7 - 12 that the novel

β -amino- β -propiolactam derivatives are the "curing agents" of the polyurethane resin. These derivatives are hydrolyzed to generate two secondary amino radicals that in turn react with the isocyanate radicals to cure the polyurethane prepolymers. Although this is an indirect moisture cure, this indirect reaction mechanism differs from Applicant's "one component" reaction mechanism. Aoki himself contrast his reaction mechanism with other traditional polyurethane curing mechanisms, at column 1 lines 43 through for example 51. He describes "one component" type polyurethane, or "so called moisture-curable polyurethane" in the prior art as;

(1) moisture-curable polyurethane compositions by use of a reaction of polyisocyanate with moisture, that is, a reaction wherein a part of the isocyanate converts to amine by the decarboxylation of the isocyanate/water adduct and resultant amine reacts with another polyisocyanate molecule to carry out curing."

The inventor declares, in the attached Declaration Under Rule 132, that moisture-curable polyurethane prepolymers which "consist essentially of polyisocyanate and polyol" are the types of one component polyurethane which Aoki contrast against his β -amino- β -propiolactam derived polyurethane. Thus, the Applicants prepolymers cure polyisocyanate directly from moisture without the need for an extraneous curing agent. Note the Scheme 1 illustration in the Declaration, as compared to Aoki's teachings at column 1, lines 43-51. Accordingly, even though Aoki had a lower percentage of isocyanate radicals, there was a different curing reaction mechanism which was not dealing with reactions that "consist essentially of polyisocyanate and polyol." We suspect Aoki is more concerned with foaming than with the need for a quicker cure. Nevertheless, he, *inter alia*, does not use the Applicant's reaction mechanism.

(3) Thirdly, the characteristic curing times for Aoki's polyurethane prepolymers, even having the lower percentage of isocyanate radicals, took substantially longer than the curing time of the present invention. That is, the curing times were about 23 minutes for a "tack free time" material, at table in example 14 at column 22 line 57, compared to tack free time of less than 6 minutes in all cases for the Applicant. In fact, as tables 5 and 6 clearly indicate, Aoki has no tack free times less than 10 minutes.

In summary, the claims as amended, are clearly distinct from the references of record, either alone or in combination, and show an unexpectedly surprising result in the curing times for such reaction mechanisms. β -amino- β -propiolactam derivatives are not as effective as the present invention, and their presence negates the teaching of lower isocyanate concentration because it would lead one skilled in the art to believe that higher cure times would result and a different reaction mechanism would be needed during cure.

The newly added claim 10 is merely presented to claim particularly preferred polyisocyanates of the present invention but contains all of the principal limitations previously searched. Accordingly, there should be no new issue.

The Applicant respectfully request that the claims be considered in condition for allowance, and the Applicant's Attorney respectfully request a telephone call if there are minor issues that could be resolved through a telephone interview.

Respectfully submitted,

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8/19/04

Date

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